

5. Performance Testing Phase (Detailed)

Once the development of the Freelancing MERN Application was completed, the Performance Testing Phase was initiated to ensure that the system functions reliably, responds quickly, and handles user interactions correctly across all modules. Testing was conducted for both frontend and backend components, focusing on functionality, speed, security, and usability.

5.1 Testing Strategy













The application was tested using a multi-layered approach involving:

1. **Unit Testing:** Verifying that individual components (like API endpoints or frontend forms) work as expected in isolation.
 2. **Integration Testing:** Ensuring that components interact properly (e.g., user login followed by project posting).
 3. **End-to-End Testing:** Simulating real user flows (Client → Post Project → Receive Bids → Select Freelancer → Submit Work → Give Feedback).
 4. **Performance Testing:** Measuring API response times, frontend load times, and resource usage using browser DevTools and Render logs.
 5. **Security Testing:** JWT validation, route protection, and blocking unauthorized access via middleware.
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5.2 Tools Used

Tool	Purpose
Postman	API testing (CRUD operations, auth headers, error handling)
Browser DevTools	Inspecting frontend load performance and network timing
Render Logs	Monitoring backend errors, response time, and crashes in production
Console Logs & Alerts	Debugging frontend errors and form validation behavior

5.3 Test Cases & Results

Feature Tested	Test Scenario	Expected Output	Status
User Registration/Login	Valid & invalid credentials	Account creation / Error message	 Passed
JWT Token Authentication	Access protected routes without token	Blocked with 401 Unauthorized	 Passed
Role-Based Access	Freelancer trying to access admin routes	Blocked access	 Passed
Project Creation (Client)	Post a project with title & description	Project appears in list	 Passed
View Projects (Freelancer)	Fetch projects with GET request	Projects visible in frontend	 Passed
Place Bid (Freelancer)	Submit bid on a project	Stored and shown to client	 Passed
View Bids (Client)	View all bids for posted project	All relevant bids visible	 Passed
Select Freelancer	Client selects one freelancer	Bid marked as "selected"	 Passed
Work Submission	Freelancer submits after selection	Work stored and marked "submitted"	 Passed
Feedback	Client gives rating and comment	Feedback stored and shown in profile	 Passed
Admin Block/Unblock	Admin blocks a user	User denied login or redirected	 Passed
Deployment Accessibility	Access app on live URL	Loads on mobile and desktop	 Passed

5.4 Performance Metrics

Metric	Target	Actual Result	Status
API Response Time (GET/POST)	< 500ms	~180ms (avg)	✅ Good
Initial Page Load	< 2.5s	~1.3s	✅ Fast
DB Query Performance (MongoDB)	Under 300ms/query	~120ms per query	✅ Efficient
Render Deployment Uptime	100% during testing	100%	✅ Stable
Error Logs	Minimal errors	No major issues	✅ Clean

🔒 5.5 Security Validations

- JWT tokens were validated for every protected route.
- Passwords were stored securely using bcrypt.
- Unauthorized access attempts (e.g., accessing admin route as freelancer) were correctly blocked with appropriate status codes.
- Malicious inputs (e.g., empty forms, invalid IDs) were gracefully handled using server-side validation.

🔧 5.6 Bug Fixes & Optimizations

Issue Found	Fix Applied
Freelancers could access feedback route	Added role-check middleware in backend
Admin dashboard UI broke on mobile	Added responsive CSS using Tailwind
Unhandled API errors	Implemented global error handling middleware
Duplicate bid entries	Added check for existing bid before allowing submission

Issue Found

Fix Applied

Token expiry not handled

Implemented frontend redirect on 401
Unauthorized



5.7 Final Assessment

The platform was successfully tested across all modules and edge cases. It is now ready for:

- User demonstration
- Mentor evaluation
- Final documentation upload

No critical issues remain, and performance is stable across user roles and devices.